



**TECHNICAL MEMORANDUM
OU8 MINE WASTE DISPOSAL OPTIONS EVALUATION
CHEROKEE COUNTY SUPERFUND SITE
BAXTER SPRINGS AND TREECE SUBSITES, OUs 3, 4, AND 8
CHEROKEE COUNTY, KANSAS**

TO: Liz Hagenmaier, EPA Task Order Contracting Officer's Representative
FROM: Chris Robb, P.E., HGL Project Manager
THROUGH: W. Alan Rittgers, P.G., HGL CLIN2 DES Program Manager
DATE: February 5, 2021
SUBJECT: Technical Memorandum, OU8 Waste Disposal Options Evaluation, Cherokee County Superfund Site, Baxter Springs and Treece Subsides, OUs 3, 4, and 8, Cherokee County, Kansas
CONTRACT: 68HE0318D0006
TASK ORDER: 68HE0720F0098

1.0 INTRODUCTION

This technical memorandum provides an evaluation of potential mine waste disposal sites in support of the final phase of Remedial Design (RD) of Operable Unit (OU) 8 of the Cherokee County Superfund Site located in southeastern Kansas. This work is being conducted by HydroGeoLogic, Inc. (HGL) under U.S. Environmental Protection Agency (EPA) Region 7 Contract 68HE0318D0006, Task Order 68HE0720F0098, in fulfillment of Contract Line Items 0001AG and 0002AG. The evaluation will support the determination of final disposal location(s) for waste materials that are generated during the Remedial Action (RA) of OU8.

2.0 PROJECT BACKGROUND

The Cherokee County Superfund Site spans 115 square miles and represents the Kansas portion of the Tri-State Mining District. It consists of mine tailings, soil, sediment, surface water, and groundwater contaminated with heavy metals (principally lead, zinc, and cadmium). The primary sources of contamination are the residual metals in the abandoned mine workings, chat piles, and tailings impoundments, in addition to historical impacts from smelting operations. During active mine operations, railroad spurs were constructed to join conventional large-scale railroads to the individual mining areas. Many of these historical railroads were abandoned in place when mining operations ceased and are the focus of OU8. The primary source of contamination identified for OU8 is the chat used to construct the rail bed ballasts.

Based on the results of previously conducted risk assessments, lead and zinc were identified as contaminants of concern posing risk to ecological receptors. As a means to mitigate these contaminants, Alternative 3 from the feasibility study (HGL, 2016) was selected as it provides protection of ecological receptors through RA involving excavation and removal of waste materials to limit exposure to and mobility of contaminants. The approach from this alternative was used to prepare the Preliminary and later the Prefinal RD for OU8, which was submitted to

EPA in January 2020 and is currently under review (HGL, 2020). Completion of the Final RD is pending selection of an off-site disposal location for the OU8 wastes.

3.0 SEGMENT DETAILS FROM THE OU8 PREFINAL REMEDIAL DESIGN

The individual waste subareas addressed by the OU8 RD have been grouped into segments based on their geographic location and the continuity of each former railroad spur. The segments are shown on Figure 1 (Attachment 1). The actual sequence of remediation for the individual areas may be revised during the RA based on funding, property access, and other factors. A summary of proposed RA work to be conducted in each segment is provided below.

- **Segment A** – This segment is oriented northeast-southwest across pasture, cultivated fields, and wooded areas. It is the longest segment and thus was divided into North and South portions in the RD.
- **Segment B** – The Jayhawk Chemical Plant (currently no property access) is located in this segment, which runs north until intersecting Segment A.
- **Segment C** – This segment runs west-east through pasture and woods on an inside curve of Spring River southwest of the City of Galena.
- **Segment D** – This former railbed is located southwest of Sunflower Pit and the City of Baxter Springs. This wooded section is bordered by cultivated fields and pasture.

The approximate length and estimated volume of waste materials to be remediated in each former railroad segment include:

Table 1
OU8 Railroad Segments

	Total Length (miles)¹	Estimated Waste Volume (BCY)²	Percentage of Total Waste Volume
Segment A - South Section	2.0	35,106	11%
Segment A - North Section	6.2	167,338	55%
Segment B	3.1	94,568	31%
Segment C	0.3	5,080	2%
Segment D	0.3	2,289	1%
TOTAL	11.9	304,381	

Notes:

1. Only includes properties with access agreements in place when the Prefinal design was submitted to EPA.
2. In-place bank cubic yards (BCY) are base values without contingencies or potential overages.

4.0 POTENTIAL DISPOSAL LOCATIONS

The following six potential disposal options were provided by EPA for this evaluation. The locations of the disposal options are shown on Figure 1.

- Former Early Bird Mine (TC-3 Complex),
- Potential Early Bird Mine Expansion (TC-29, located west of the TC-3 Complex),

- Remaining OU4 sites west of Treece, Kansas,
- OU6 Crestline Subsidence Pit,
- Former OU5 subsites near Galena, Kansas, and
- A combination of multiple repositories.

The waste disposal evaluation considered the following items:

- Whether all of the OU8 waste will physically fit at a given disposal location.
- The haul distance (and associated potential safety concerns) and economics of transportation of waste to the various disposal locations.
- Whether emplacing all or a majority of the OU8 waste in a repository would increase the repository height or side slope steepness to undesirable levels or extend its footprint into the floodplain of a nearby waterway.
- Whether access could be obtained, and property owners' potential unwillingness to allow off-site waste to be imported and disposed on their property.

A summary of the evaluation of these six disposal options is presented in Table 2 (Attachment 2).

5.0 EVALUATION SUMMARY AND RECOMMENDATIONS

All of the disposal options have sufficient space to allow placement of all the OU8 waste, with the exception of the OU6 Crestline Subsidence Pit. Based strictly on their large size and capacity to accept all the waste, the former Galena OU5 subsites location and the remaining Treece OU4 sites (Phases 2 through 5) are the preferred locations because their large footprint provides the most options for repository layout, reduced side slopes, and final heights, etc.

The former OU5 subsites location is the closest to the bulk of the OU8 work areas. However, most of the OU8 work areas are on the opposite (east) side of Spring River from the OU5 sites, and a limited number of bridge crossings with adequate weight capacity cuts the resulting haul distance advantage of this option down to just a few miles, relative to the Treece locations. The Early Bird Mine and remaining Treece OU4 sites are located about one-half mile apart, so there is minimal advantage to using either of these options in terms of transportation between them, given the relatively long haul distance from the furthest extent of the OU8 work area (approximately 28 miles one way).

Based on these considerations, the recommended disposal location is the OU5 subsites area north of the City of Galena. It provides the greatest advantage in terms of combined constructable area and relatively short haul distance. Limiting the haul distance and thus reducing transportation (and possibly road repair) costs will reduce the overall cost of the RA. However, it is likely that the City of Galena will have concerns over the amount of haul truck traffic. Concerns from the City may be offset somewhat by highlighting the potential beneficial use of turning the existing barren site into at least pasture-grade quality and constructing a repository at this location could create an opportunity to cover any remaining contamination, if present, and address the site's partially remediated status.

The secondary recommendation would be disposal at one (or more) of the remaining Treece OU4 subsites. The advantages of this approach include disposal on existing waste at the ground surface

on a large undeveloped property. The primary challenges with this option include convincing one or more landowners to accept imported waste from someone else's property, and either relocating a portion of Tar Creek or building a repository outside its floodplain limits.

It should also be noted that regardless of which final disposal location is selected, there may be some value in filling/capping the OU6 Crestline Pit during the OU8 RA activities, to improve Site safety and bring closure to its remedial status.

6.0 REFERENCES

HydroGeoLogic, Inc. (HGL), 2016. *Final Feasibility Study, Cherokee County Operable Unit 8 Railroads Site, Cherokee County, Kansas*. July.

HGL, 2020. *Prefinal Design Letter Report for Remedial Design of OU8 Railroads, Cherokee County Superfund Site, Cherokee County, Kansas*. January.

ATTACHMENTS:

Attachment 1 Figure 1 - Waste Disposal Options Evaluation

Attachment 2 Table 2 - OU8 Waste Disposal Options Evaluation

ATTACHMENT 1

FIGURE 1 - WASTE DISPOSAL OPTIONS EVALUATION

ATTACHMENT 2

TABLE 2 - OU8 WASTE DISPOSAL OPTIONS EVALUATION

Table 2
OU8 Waste Disposal Options Evaluation
OU8 Mine Waste Disposal Options Evaluation Technical Memorandum
Cherokee County Superfund Site, Baxter Springs and Treece Subsites, OUs 3, 4, and 8, Cherokee County, Kansas

Disposal Option	Area (acres)	Property Owner(s)	Benefits	Disadvantages
Early Bird Mine Site (TC-3 Complex)	118 (79 acres with mine waste at surface)	Bingham Sand & Gravel	Already has unremediated waste present so no clearing would be required and imported waste could be disposed of at one of several areas available on site	<ul style="list-style-type: none">• There are already ~200,000 BCY of waste on site plus an unknown volume imported from the recent Northwest Tributary Remedial Action (RA), which will reduce the overall waste storage available or increase the height and/or side steepness of the final repository• Relocating Tar Creek and/or the extent of its floodplain may reduce available working area and repository footprint• Extended haul route (13 miles) from the midpoint of the OU8 remedial work
Early Bird Mine Expansion (TC-29)	40 (27 acres with mine waste at surface)	Jennings	Already has unremediated waste present so no clearing would be required and imported waste could be disposed of at one of several areas available on site	<ul style="list-style-type: none">• No repository was originally planned for this site• There are already ~85,000 BCY of waste on site, which will reduce the overall waste storage available or increase the height and/or side steepness of the final repository• Relocating Tar Creek and/or the extent of its floodplain may reduce available working area and storage on the parcel• Extended haul route (13 miles) from the midpoint of the OU8 remedial work
Other OU4 Sites (Tar Creek Phases 2 through 5)	~300 (~182 acres with mine waste at surface)	<ul style="list-style-type: none">• Bingham Sand & Gravel (2)• Hurd (3)• Adams (2)• Ober• Woodcock• Colbert	<ul style="list-style-type: none">• Already has unremediated waste present so no clearing would be required and imported waste could be disposed of at one of several areas available in the general area• Spacious area provides many options for repository layout	<ul style="list-style-type: none">• Larger travel distance (14 miles) from the midpoint of the OU8 remedial work• Importing additional waste for disposal will increase the challenge of placing repositories outside the 100-year plain of Tar Creek and likely increase the height and/or side steepness of the final repository
OU6 Crestline Subsidence Pit	0.5	SEK Regional Landfill, LLC	<ul style="list-style-type: none">• Two-fold benefit of providing below grade disposal of waste plus backfilling the subsidence pit to the ground surface• Close to multiple segments of OU8 railroads	Small disposal volume available (47,500 BCY assuming the pit is 150 feet deep) will not be sufficient to accept all of the OU8 waste
Former OU5 Sites (Galena, KS)	100±	~32 parcels (the City of Galena and Macka Properties, LLC are the primary owners as a percentage of total area)	<ul style="list-style-type: none">• Any residual contamination, if present, from previous partial RAs could be consolidated and covered• Closest large disposal area to the majority of OU8 waste volume• Moderate haul route (9.5 miles) from the midpoint of the OU8 remedial work	<ul style="list-style-type: none">• Could create a substantial amount of truck traffic through the City of Galena• Places waste onto a site that has already been remediated, even if only partially• Will need to work around existing railroad lines and floodplain of Short Creek• Being located on the opposite side of Spring River limits the haul route options because truck traffic will need to utilize a bridge
Multiple Repositories	Varies	Various	<ul style="list-style-type: none">• Will decrease OU8 waste hauling distance by distributing OU8 waste to the nearest repository• Spreading the OU8 waste across multiple sites will create small increases in each repository’s height versus larger height at a single repository	<ul style="list-style-type: none">• Increased number of property owner access and access points to manage• Requires convincing multiple property owners to allow off-site waste to be imported and disposed on their property• Multiple haul routes increase the number of public roads traveled on and the responsibility of maintaining/repairing them• Increased number of sites for KDHE operation and maintenance

Notes:
Parcel ownership data obtained from Cherokee County, Kansas, Appraiser’s website accessed on 12/7/20.
BCY = bank cubic yard
KDHE = Kansas Department of Health and Environment
OU = operable unit